



ENERGY

California Solar Initiative (CSI) Market Assessment Studies

Task 1: Third Party Ownership Market Impact Study

June 13, 2014

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Content of Report

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9:30	Study Objectives
9:40	Key Findings
10:05	Recommendations
10:15	Q&A

Email questions to: charlie.bloch@navigant.com

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The purpose of this study was to explore how the advent and prevalence of third-party ownership (TPO) is affecting the development of a robust and sustainable rooftop solar industry in California.

Key Objectives of the Study

- Understand the market for TPO systems in California
- Assess third-party-owner market share and trends
- Describe the current status of alternative PV financing mechanisms in California
- Provide an overview of TPO delivery models, including the roles of solar finance companies, solar installation contractors, investors, and special purpose entities
- Review TPO contract features, particularly with regard to potential issues of consumer protection
- Investigate certain economic aspects of third-party ownership, such as value over the life of the agreement
- Assess customer experiences with their TPO systems and contracts
- Gauge compliance with certain provisions of Public Utilities Code (PUC) 2869*

*PUC 2869 requires that a third-party provider file notice with the county recorder office when a PV system is installed using a TPO arrangement.

The Navigant team relied upon several research strategies to inform this study.

PowerClerk Data Analysis	<ul style="list-style-type: none"> • Analysis of the CSI program database, also referred to as the PowerClerk database (2007-2012)
In-depth Interviews	<ul style="list-style-type: none"> • Solar finance companies (SFCs) • Solar installation contractors • Organizations implementing PACE programs • Loan servicing companies providing PUC 2869 compliance services
Surveys	<ul style="list-style-type: none"> • Surveys of CSI host customers with a TPO system in each of the three IOU service territories
TPO Contract Review	<ul style="list-style-type: none"> • Review a sample of TPO contracts extracted from PowerClerk
Review of County Recorder Records	<ul style="list-style-type: none"> • To determine compliance of PUC 2869 by SFC, Navigant reviewed a sample of county recorder records for installed solar PV systems
Economic Analysis	<ul style="list-style-type: none"> • Economic analysis of the key terms of a sample of TPO contracts

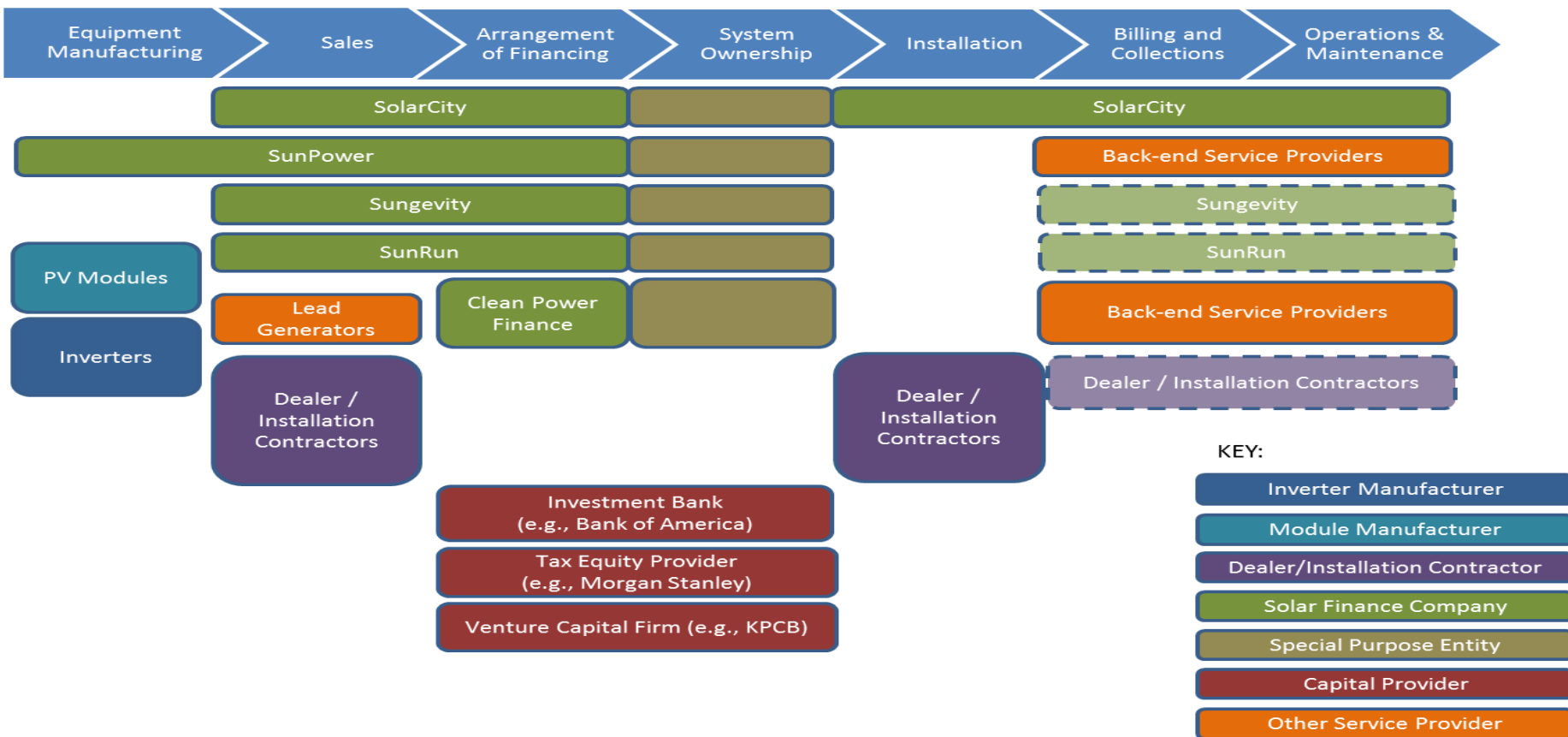
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Key market actor roles and relationships along the value chain differ among the largest third-party owners in California.

Example Market Actors and their Roles in the TPO Value Chain

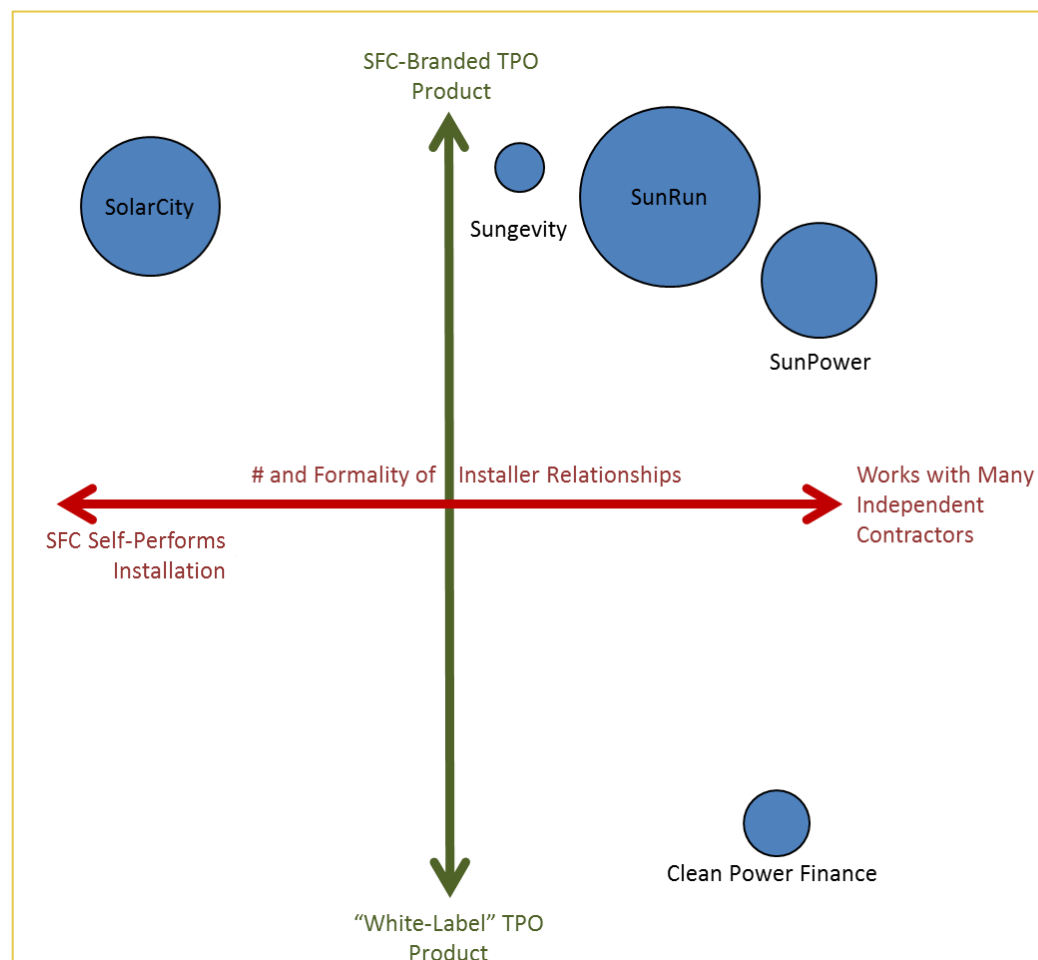


Source: Navigant team analysis of PowerClerk database, August 2013

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Various third-party ownership delivery models have developed and are continuing to evolve.

- » Positioning map for SFC-installer relationships
 - Top 5 SFCs in the California market (based on CSI program data through 2012)
- » There is no single strategy for serving California's residential (and non-residential) customers with customer-side PV.
 - SolarCity: fully-integrated supply chain strategy, excluding manufacturing.
 - SunPower: integrated upstream value chain, subcontracts installations.
 - Clean Power Finance: alliance strategy, connecting capitals markets with installation contractors.



Note: Size of circles represents relative share of installed residential TPO capacity in California. Circle sizes and relative positioning are approximate.

(Source: Navigant's California Solar Initiative Third-Party Ownership Market Impact Study, 2014; Conducted on Behalf of the California Public Utilities Commission [CPUC])

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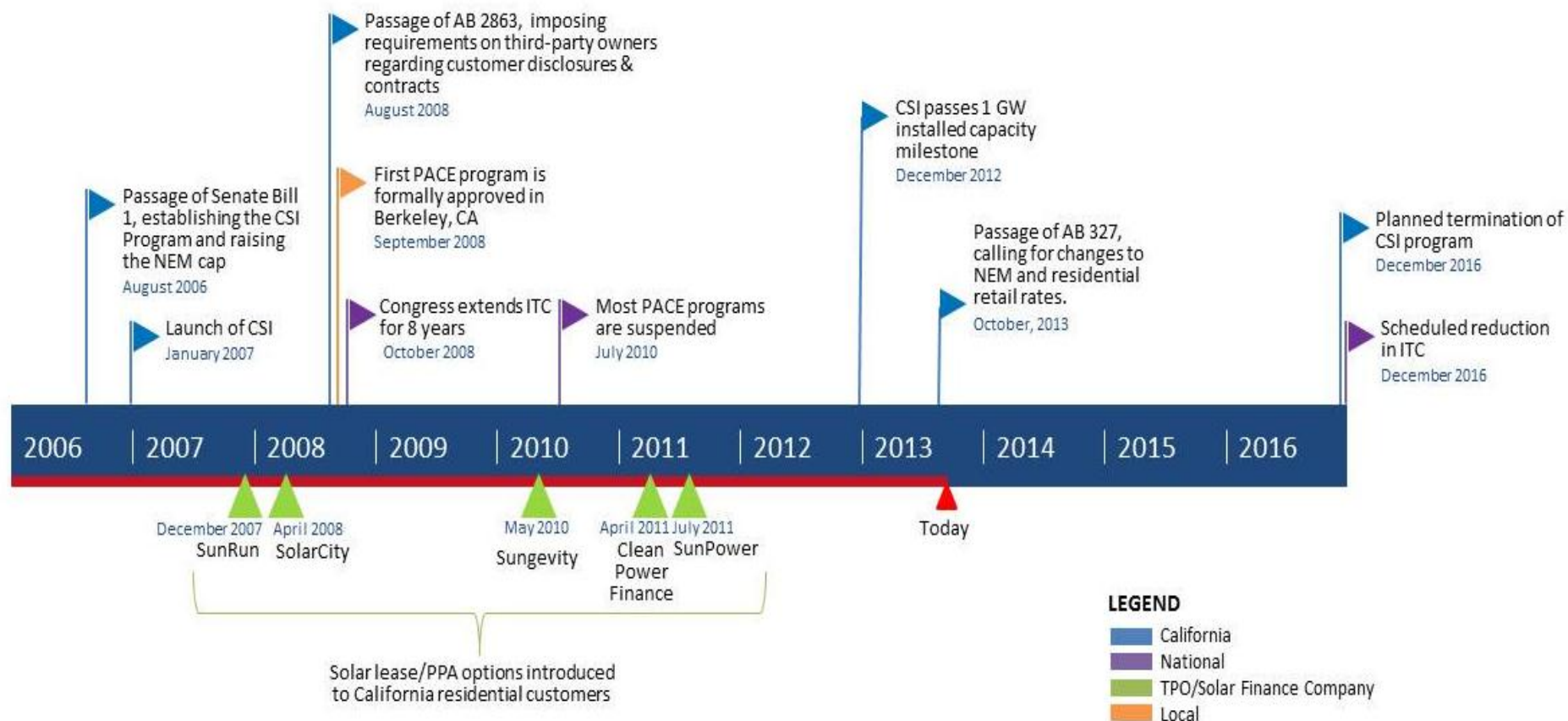
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The TPO delivery model and market benefited from a favorable policy environment, particularly in California.

- Several key policies combined to provide the ideal environment for TPO, contributing to the market's rapid growth.
 - CSI program incentives (and long-term approach)
 - Investment tax credit
 - Accelerated depreciation
 - Net energy metering (NEM)
 - Tiered residential rates
- The uncertainty around the future of NEM and residential rate reform enabled by Assembly Bill (AB) 327, however, is a potential cause for concern. The outcomes of those proceedings will impact the economics for both host-owned and TPO customer-side solar PV systems.

Net energy metering has played a particularly important role in driving the growth of the TPO market segment.

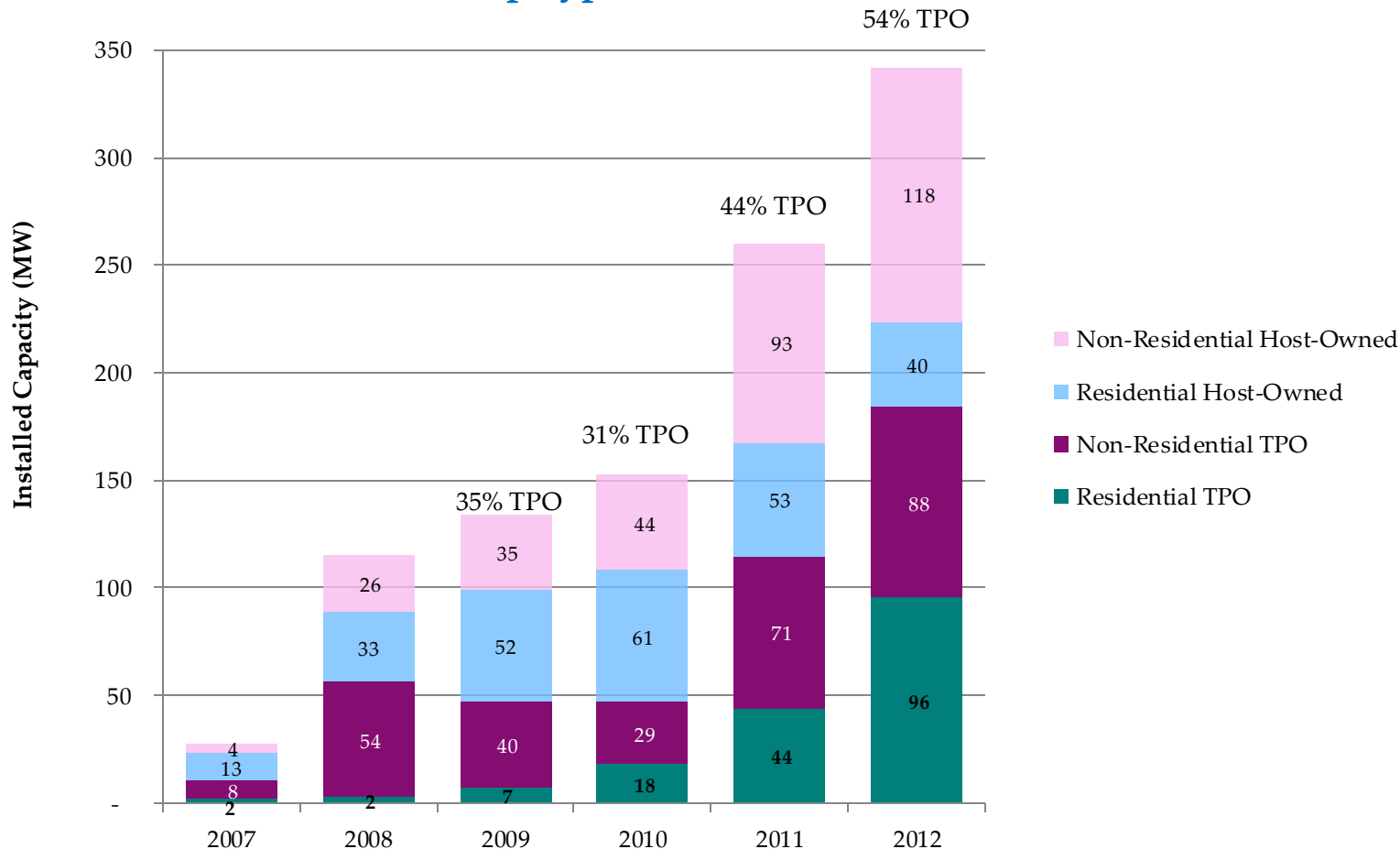
Key Dates in California Solar Market History



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The increase in third-party ownership has contributed significantly to the overall expansion of the California solar market.

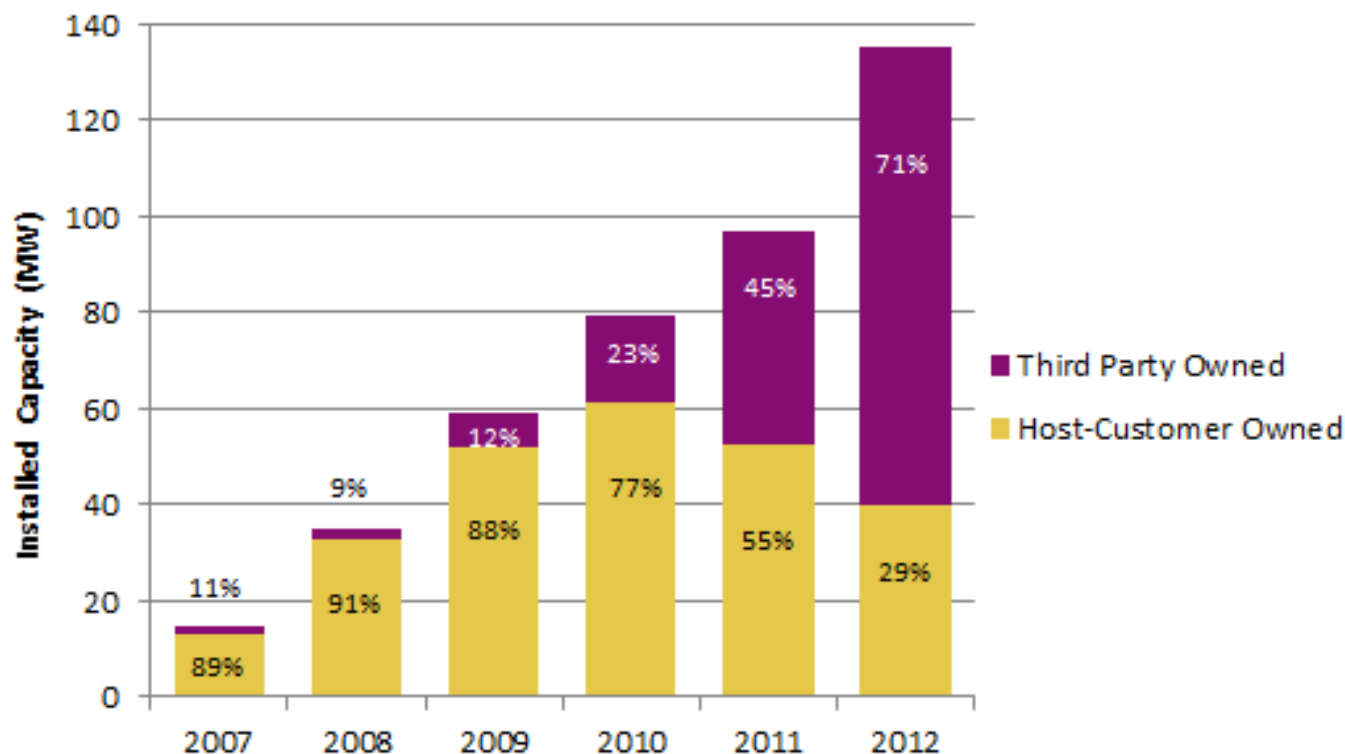
CSI Installed Capacity by Year, Sector, and Ownership Type (Incremental)



Source: Navigant team analysis of PowerClerk data, February 2013

The shift has been dramatic in the residential sector, where nearly three-quarters of CSI capacity installed in 2012 was third-party owned.

Incremental Installed Capacity of CSI Systems by Financing Type for Residential Installations

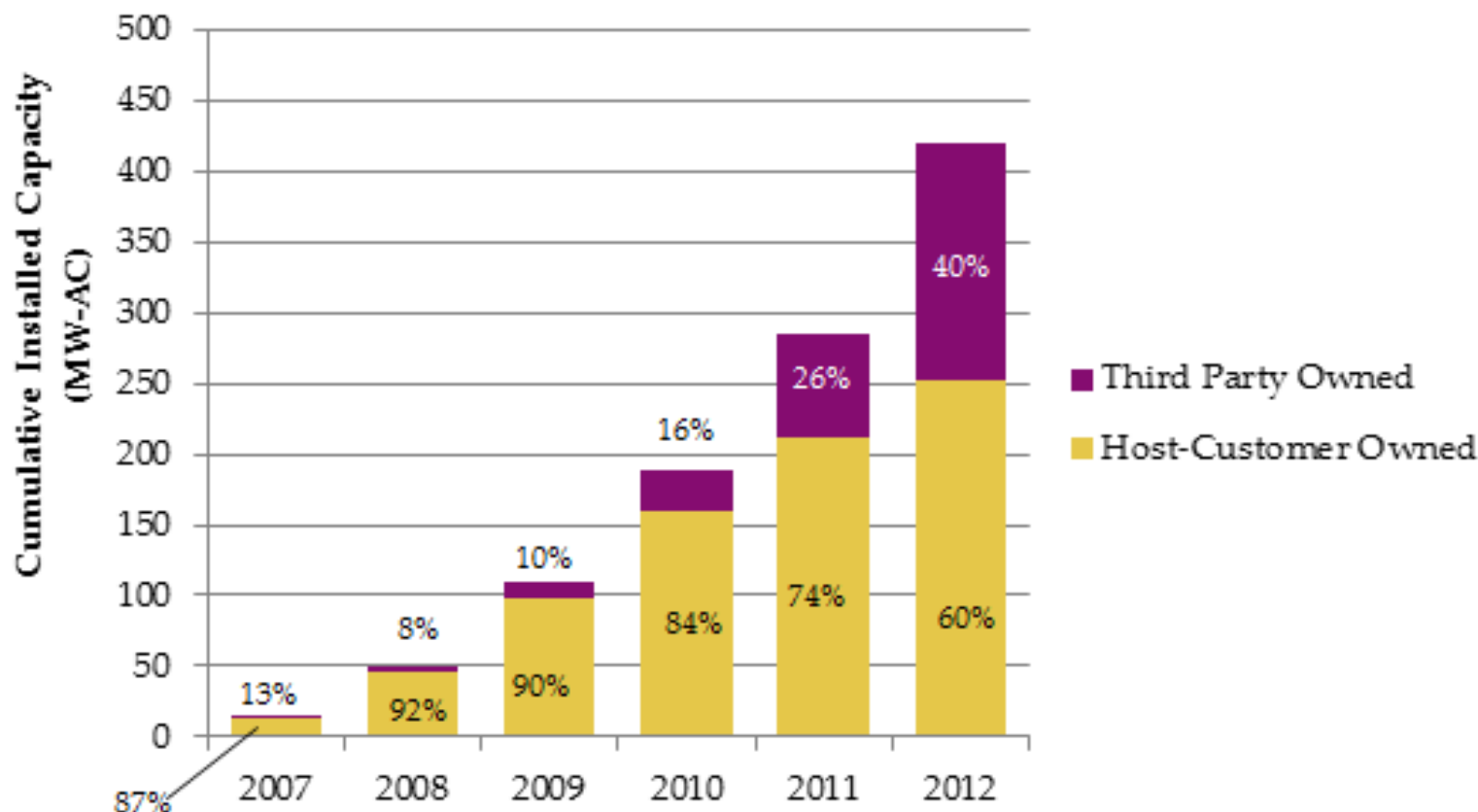


Source: Navigant Team analysis of PowerClerk database extract from 2007 through December 31, 2012

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Since 2010, residential host-owned systems have declined each year in both market share and the amount of new capacity installed.

**Cumulative Installed Capacity of CSI Systems
by Financing Type for Residential Installations**

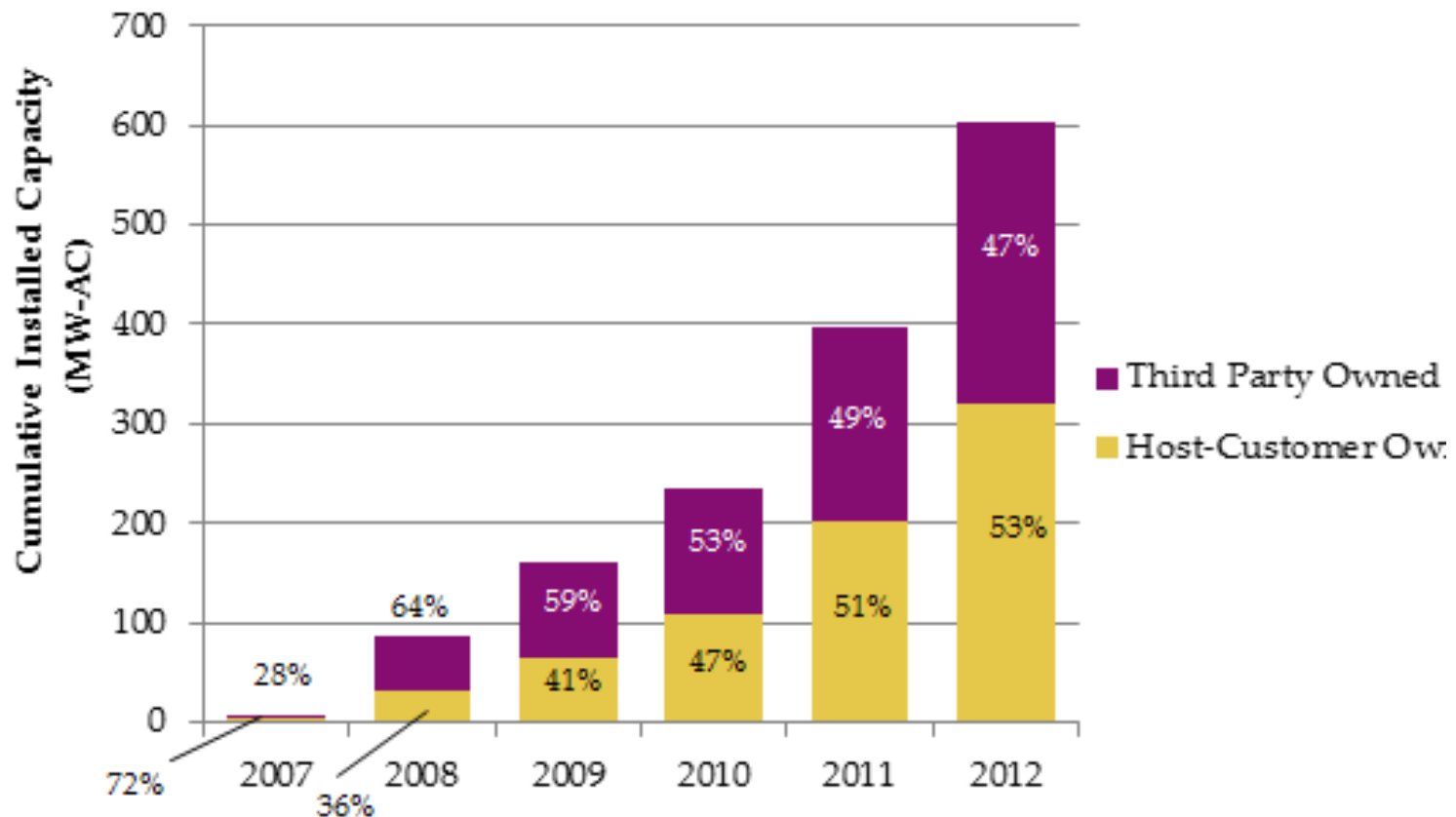


Source: Navigant team analysis of PowerClerk database extract from 2007 through December 31, 2012

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In contrast to the residential sector, there is no consistent trend toward third-party ownership in the non-residential sector.

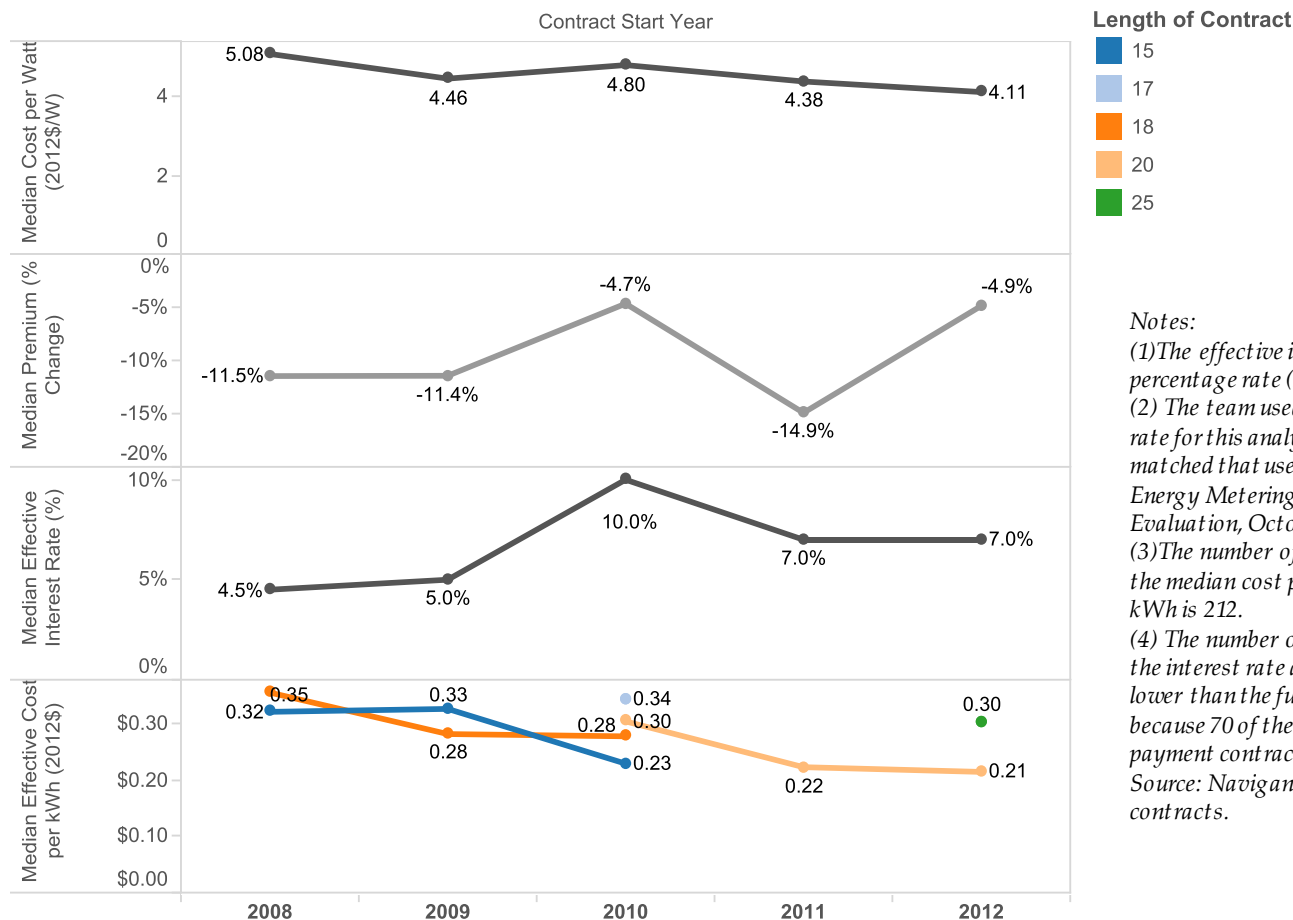
Cumulative Installed Capacity of CSI Incented Systems by Financing Type for Non-Residential Installations



Source: Navigant team analysis of PowerClerk database extract from 2007 through December 31, 2012

Analysis of financial terms for a sample of TPO contracts shows no evidence of consumer protection issues related to TPO system pricing.

Key TPO System Financial Metrics over Time



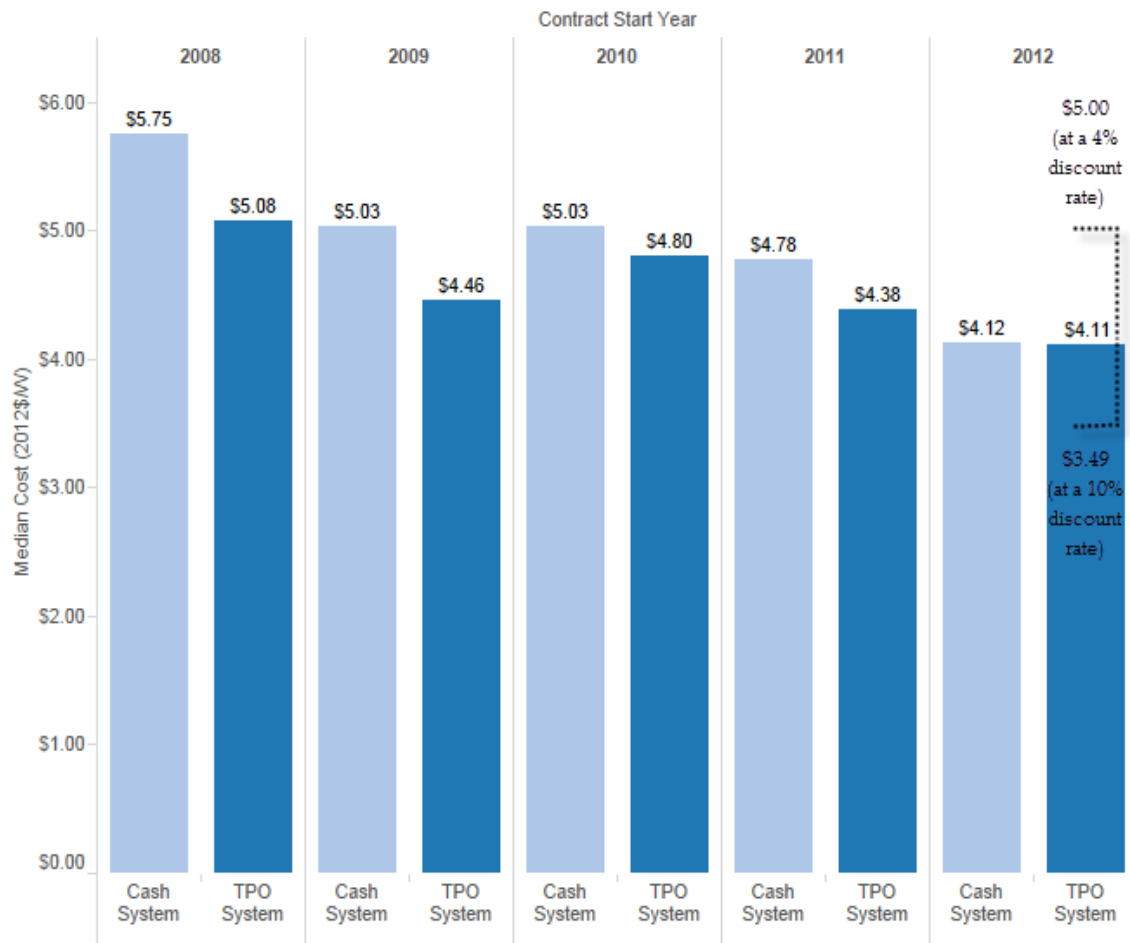
Notes:

- (1) The effective interest rate is an annualized percentage rate (APR).
 - (2) The team used a 6.96 percent discount rate for this analysis. This discount rate matched that used in the California Net Energy Metering Ratepayer Impacts Evaluation, October 2013 (page F-9).
 - (3) The number of TPO contracts included in the median cost per watt and median cost per kWh is 212.
 - (4) The number of TPO contracts included in the interest rate analysis is 142. This value is lower than the full sample of 212 contracts because 70 of the contracts are full pre-payment contracts.
- Source: Navigant team analysis of CSI contracts.

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In 2012, the median installed per-watt cost of TPO systems was close to that of host-owned systems, with a difference of only \$0.01/W_{AC}.

Modeled Cost per Installed Capacity (2012\$/W_{AC}) for Sampled CSI Projects



Notes:

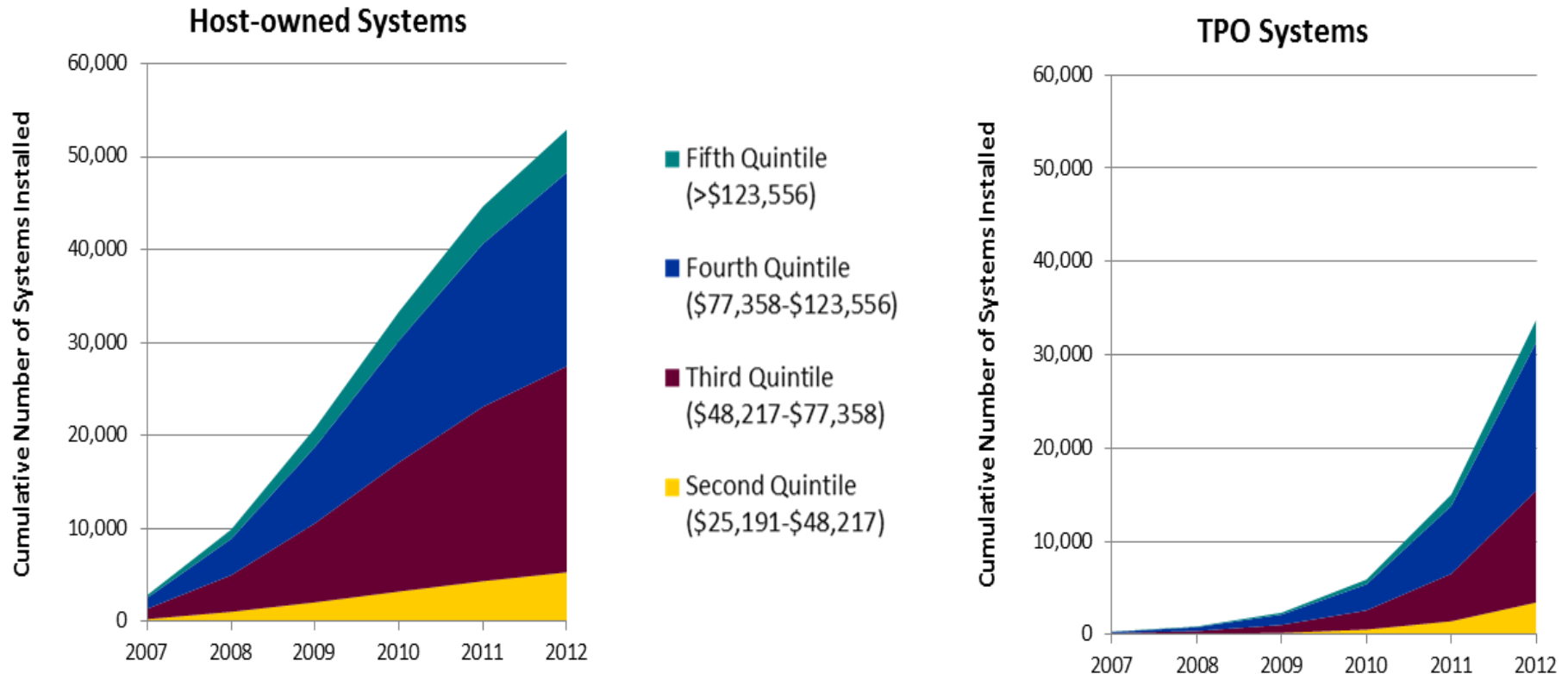
- (1) The TPO system costs in \$/W are the present value of the full cost for the TPO system (in 2012\$) divided by the installed capacity (Watt-AC).
- (2) The team used a 6.96% discount rate for this analysis. This discount rate matched that used in the California Net Energy Metering Ratepayer Impacts Evaluation, October 2013 (page F-9).
- (3) The number of TPO contracts used to create this chart was 212. The number of contracts per year is available in Appendix A.
- (4) The comparable host-owned system (cash system) cost is based on the average value from the CSI database, PowerClerk, for host-owned systems. The team calculated the cash system price using non-TPO data and included the effect of the CSI program incentives and the 30% investment tax credit.

Source: Navigant team analysis of CSI contracts.

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The team found no meaningful evidence that TPO has substantially increased access to solar PV for lower income levels.

**CSI Residential Systems Installed by Median Income
Level of Host Customer ZIP Code (Cumulative)**



Source: Navigant team analysis of PowerClerk data, February 2013.

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Larger solar finance companies' agreements cover most consumer protection contract terms; smaller companies are less likely to do so.

- **System Maintenance, Monitoring, and Performance:** Most residential and all non-residential TPO contracts indicate the solar finance company (SFC) is responsible for system maintenance and monitoring. Most contracts include a performance guarantee.
- **Re-roofing During the Contract Term:** All contracts indicate that removal and re-installation of the solar system due to re-roofing is the financial responsibility of the homeowner.
- **PV System Removal & Roof Repair at the End of the Contract Term:** Almost all of the contracts reviewed indicated that the SFC is responsible for removing the system at the end of the contract term and repairing any damages to the roof.
- **Default Provisions:** All residential and non-residential contracts have strict customer default provisions. All non-residential contracts provided the customer an option to terminate the agreement in event of SFC default, but only 35% of residential contracts included this provision.

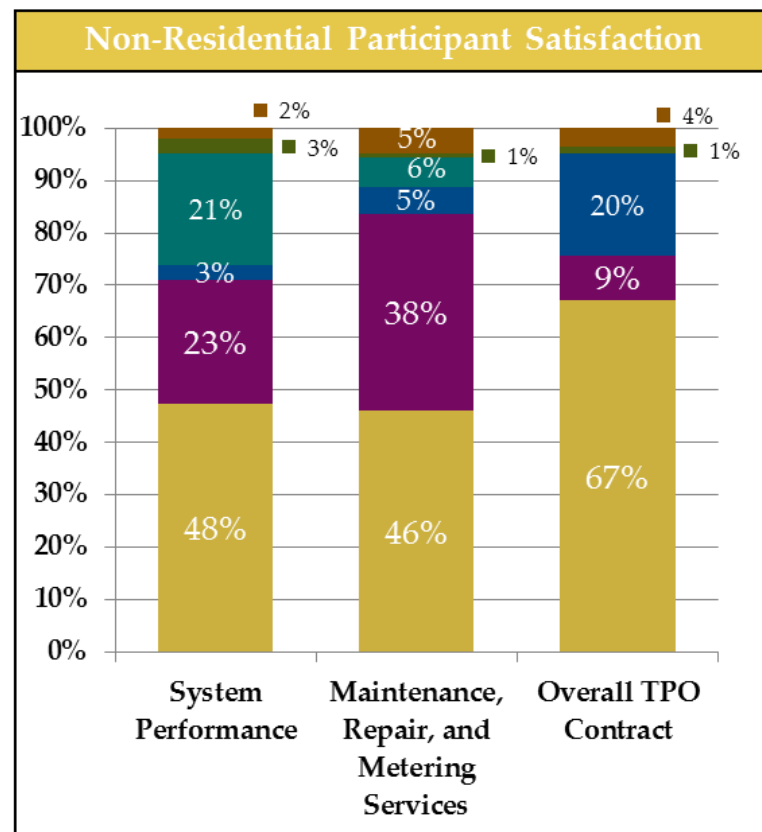
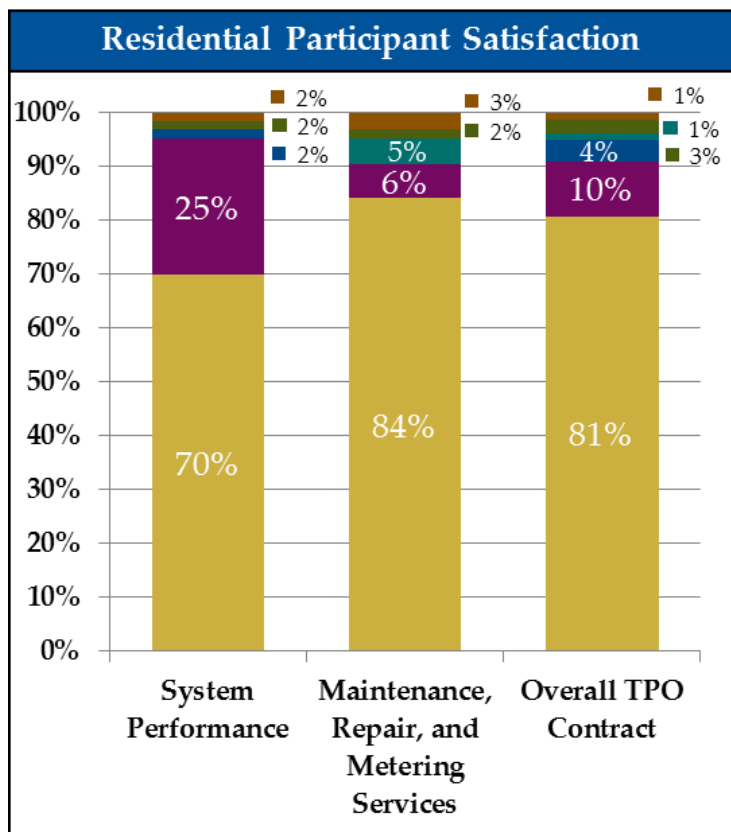
Source: Based on a sample of TPO contracts taken from CSI PowerClerk data.

Larger solar finance companies' agreements cover most consumer protection contract terms; smaller companies are less likely to do so.

- **Sale of Property:** Most contracts included provisions in the case of the building owner selling their property.
 - Residential contracts most frequently direct that the agreement be transferred to the new property owner or that the existing customer purchase the system.
 - Non-residential contracts most frequently direct that the agreement be transferred to the new property owner or that the system be moved to the existing customer's new property.
- **Early termination:** The majority of residential contracts and all non-residential contracts offered either an early buy-out or termination option.
- **End of contract term:** Most residential contracts offer three options at the end of the term, purchase of the system, renewal of the contract, or removal of the system (typically at the SFC's expense). All of the non-residential contracts offered multiple options but half of the non-residential contracts stipulate that the customer is financially responsible for system removal, not the SFC.

Source: Based on a sample of TPO contracts taken from CSI PowerClerk data.

Customers are generally satisfied with the TPO systems, contracts and support SFC's provide, though more so in the residential sector.



Sources: Navigant surveys of 78 residential CSI TPO participants and 64 non-residential CSI TPO participants

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Additional Customer Satisfaction Results

- Majority (85%) of residential CSI TPO participants believes that the solar PV system itself increases the value of their home.
- About half of residential and non-residential customers surveyed had no significant concerns at the time they entered their TPO arrangements. Those who had concerns most often cited one of the following:
 - what would happen if/when the building was sold
 - the contract length
 - end-of-contract and buy-out provisions
 - long-term stability of the SFC
 - whether or not the solar PV company would properly maintain the system
- Participants with TPO agreements in place for some time (at least one year) had relatively few lingering or new concerns about their contract terms.
 - Residential: 17% cited new or ongoing concerns, primarily contract length or end-of-contract/buy-out options
 - Non-residential: 24% cited new or ongoing concerns, primarily dissatisfaction with SFC's post-installation subcontractors (e.g., billing and collections or maintenance)

Sources: Navigant surveys of 78 residential CSI TPO participants and 64 non-residential CSI TPO participants

Public Utilities Code 2869 Compliance

- Code was part of Senator Leno's 2008 CA Assembly Bill No. 2863, Chapter 535, which came into effect in 2009.
- Established to notify and protect prospective property buyers and interested parties of the establishment of an existing solar contract on the property or adjacent properties.
 - Once a TPO solar contract is established between a solar developer and a resident, the solar developer is required to file a Notice of Independent Solar Energy Contract with the county recorder's office, informing potential homebuyers that there is a financial obligation tied to the property.
- Navigant's PUC 2869 compliance review showed that 82 percent of the sampled records (59 of 72) were compliant with the provisions of the code.

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The CSI Program and the CPUC may consider a variety of roles in a post-incentive world.

Options for CSI/CPUC Going Forward

Continue to require and provide “market-defining” data on solar PV installations in California.

- Market actors repeatedly emphasized the value of the publicly available CSI installation data (i.e., California Solar Statistics website).
- The CPUC can help sustain the market by continuing to require the provision and sharing of such data.
- The CPUC has already initiated a process to collect such data through interconnection applications.

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The CSI Program and the CPUC may consider a variety of roles in a post-incentive world.

Options for CSI/CPUC Going Forward

Provide resources to customers about solar PV benefits, costs, and risks to facilitate educated adoption of third-party-owned arrangements.

- Help fill gaps in customer understanding of TPO and address concerns regarding changes in NEM rules or retail rates.
- Potential resources might include the following:
 - **Online Tool for Potential TPO PV Customers:** Online tool or calculator to help customers understand the economics of going solar versus staying with their utility under various rate structures. The tool could also serve to inform existing TPO customers whether they have paid more or less with solar than they would have without it.
 - **Frequently Asked Questions (FAQs):** Discuss PV and TPO topics such as minimum suggested contract provisions, taxability of incentives, and utility rate escalation assumptions.

The CSI Program and the CPUC may consider a variety of roles in a post-incentive world.

Options for CSI/CPUC Going Forward

SFCs should include a standard, minimum set of financial terms in all TPO agreements.

- Contracts reviewed for the economic analysis revealed that some contracts do not contain information such as length of term or system size.
- Other contracts were unclear because terms were not clearly labeled as material or informational.
- All TPO agreements should include the following *minimum* terms or provisions and clearly label each as to whether they are in effect in that agreement or provided for information only.
 - Monthly or annual production performance guarantee or range of performance
 - System size
 - Down-payment and amount
 - Monthly payments or cost per kWh produced
 - Length of term
 - Escalation rates or schedule of payment amounts
 - Total expenditure or range of expenditures, over the term of the agreement

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The CSI Program and the CPUC may consider a variety of roles in a post-incentive world.

Options for CSI/CPUC Going Forward

SFCs should also continue to refine their standard residential contract terms and conditions to fully address consumer protection issues.

- These terms should give customers clear and reasonable options in the event of home sale, re-roofing, SFC default, and contract termination.
- To ensure that these refinements are consistent across TPO providers, market actors could collaborate on standard agreements through a working group or other forum.
 - The Solar Access to Public Capital (SAPC) working group recently released three standard contract templates for residential leases and commercial PPAs.
- Standardized contracts would also facilitate the securitization and sale of TPO agreements in capital markets.

See the National Renewable Energy Laboratory, Renewable Energy Project Finance, Solar Access to Public Capital working group. https://financere.nrel.gov/finance/solar_securitization_public_capital_finance.

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The CSI Program and the CPUC may consider a variety of roles in a post-incentive world.

Options for CSI/CPUC Going Forward

The CPUC should consider mandating that TPO contracts include covenants to protect the customer if the SFC goes out of business or the asset is sold.

- Such provisions could specify that a priority stream of payments is set aside to cover maintenance and warranty of the systems.
- Interviews with market actors indicate that the agreements between the solar PV finance companies and the special purpose entities used to finance TPO systems address these issues; however, since these confidential contracts are not subject to CSI reporting requirements, the research team was not able to verify this independently.

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The CSI Program and the CPUC may consider a variety of roles in a post-incentive world.

Options for CSI/CPUC Going Forward

The CPUC should conduct additional near-term and ongoing research to better understand the changing characteristics of the TPO market and improve the granularity of certain analyses conducted in this study.

- Such efforts can help to identify isolated or emerging gaps in consumer protections.
- That research might include any or all of the following:
 - Sensitivity and scenario analysis around financial metrics.
 - Analysis to understand average system size differences between TPO and host-owned systems.
 - Repeat customer surveys every 2-3 years to track how the TPO market is evolving.
 - Conduct contract reviews and system financial analyses on the systems hosted by those who respond to surveys. Use this analysis to determine how well TPO contract terms and pricing align with customer awareness and expectations.
 - As time passes, include additional survey questions targeting TPO customers who have exercised buy-out provisions or sold their homes to identify whether any consumer protection concerns have arisen.

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